

close, rather prominent cells, which are more abundant on certain parts of the branches, and form roundish nodules.

This species may be named *Paragorgia Johnsoni*, after its discoverer.

Hab. Madeira.

XV.—*A Revision of the History, Synonymy, and Geographical Distribution of the recent Cranial and Orbicular.* By LOVELL REEVE, F.L.S., F.G.S.

1. CRANIA, Retzius.

THE shell of this Brachiopod was first known in a fossil state. The calcifying functions of the animal are exercised chiefly by the under lobe of the mantle, for the secretion of a thickened adherent valve, unconnected by any hinge or ligament with the upper valve; and, before the time of Linnæus, it was named *Nummus*, and sometimes *Nummulus Brattenburgensis*, "Brattenburgh money." Linnæus and Chemnitz still confounded recent and fossil specimens together; and the separation of the valves led naturalists, among whom were Müller and Montagu, to describe them as Limpets. A curious character in the adherent valve of this genus, and which seems to have attracted the attention of Linnæus, is a similitude, in the configuration of the internal muscular scars and protuberances, to a human face. A little above the centre a raised callosity, termed the rostellum, forms the nose, and the scars of the two posterior adductor muscles of the animal give the resemblance of a pair of eyes, while the anterior thickened rim serves for the outline of the cheeks and chin. This fanciful representation suggested to Linnæus the name *Anomia craniolaris*; and *Crania* was soon afterwards proposed by Retzius to separately distinguish the group.

Defrance described several fossil species of *Crania*. The first special monograph of the genus which included the recent species was made, in 1828, by M. Höninghaus of Crefeld. Since that period, the *Crania* have been ably studied by Sowerby, Deshayes, Davidson, and Suess; and, although little has been added to our knowledge of the species, some interesting particulars have been collected of their geographical and bathymetrical distribution and their bearings on geological phenomena. The revision which I propose to make of the synonymy will be indicated in the following analysis of the species. Only four recent species have been collected. *C. anomala*, of our own coast, the best-known species of the genus, ranges from Spitzbergen, in the north of Europe, to Vigo Bay, in the south. Here it stops.

Prof. Suess has observed that *C. anomala* ranges over this area closely, both in locality and depth of habitat, with *Terebratulina caput-serpentis*. Wherever one species is found between Spitzbergen and Vigo, the other is found also; but *C. anomala* does not pass with *T. caput-serpentis* into the Mediterranean, nor to North America; and he deduces some interesting conclusions from this, in connexion with their fossil distribution, with the view of showing the relations of their existence in time as well as in space. Another species, which I refer to Poli's *Anomia turbinata*, appears in the Mediterranean, and it was dredged in the Ægean by Prof. Forbes from depths varying between 50 and 150 fathoms. A third species, *C. rostrata*, is recorded from West Africa; and a species, which I have the pleasure of naming *C. Suessii*, has been collected by Mr. Strange at Sydney, East Australia. No *Crania* has as yet been found in the New World. *C. radiosa*, described by Dr. Gould from Rio Janeiro, proves to be an *Orbicula*, which genus is not uncommon in the waters of South and Central America.

In *Terebratula* and *Rhynchonella*, it may be as well here to mention, the natural position of the mollusk is to repose upon its back; the lower valve of the shell is the dorsal valve, and the upper or ventral valve, from which anchorage is obtained, projects over one side, like a beak, for lowering the tendons. In *Crania* the position of the mollusk is reversed; the ventral valve is undermost, and, having no need, or even space, for a tendinous anchor, the valve becomes agglutinated at once to the place of attachment. It will be observed that in the genus *Orbicula* the shell is not so closely adherent, and there is a tendinous muscle of attachment passing through a fissure in a disk of the under valve; and it has been conjectured that the same thing obtains in a rudimentary form in *Crania*, in an early stage of its development. The arms or brachial appendages of *Crania* have no internal apophysary skeleton for their support. They are folded into a pair of spiral coils, which are directed towards the concavity of the upper valve, and supported there by a central prominence, termed the rostellum, rising up between them from the lower valve. This valve, as with other adherent shells, varies considerably in thickness in different individuals of the same species, according to the nature of its place of attachment.

Synopsis of Species.

1. *Crania anomala*, Müller, Zool. Dan. vol. i. p. 14, pl. 5. figs. 1 to 7.

Patella anomala, Müller.

Anomia craniolaris pars, Linnæus.

Patella distorta, Montagu.

Patella kermes, Humphreys.
Orbicula Norvegica, Lamarck.
Crania personata, Lamarck.
Crania Norvegica, Sowerby.
Criopus anomalus, Fleming.
Crania anomala, Lovén.

Hab. North Atlantic, from Spitzbergen to Vigo Bay.

The typical form of this species is orbicular, slightly truncately squared on the posterior side, with the vertex produced into a small and rather sharp hook, a little posterior to central. On a flat surface, undisturbed in growth by any surrounding obstacles, it is of the symmetrical form just described; but where numerous specimens encumber one another, they become distorted, and, if attached in a declivitous position, acquire an abrupt convexity. Professor Suess has observed that *Crania anomala* ranges along the Atlantic seaboard between Spitzbergen and Vigo Bay, in company always with *Terebratulina caput-serpentis*, but does not extend its range with that species to North America or to the Mediterranean.

2. *Crania turbinata*, Poli, Test. Sicil. vol. ii. p. 189, pl. 30.

Anomia turbinata, Poli.
Crania ringens, Höninghaus.

Hab. Mediterranean and Ægean Seas (attached to stones and coral, at depths of from 40 to 150 fathoms): E. Forbes.

Crania turbinata is a smaller and more conical species than *C. anomala*, and the internal rostellum is less prominently developed. It is the only species inhabiting the Mediterranean. In the Ægean Sea Professor E. Forbes collected living specimens at depths varying between 40 and 90 fathoms; and dead specimens were brought up with the dredge from the depth of 150 fathoms. Poli's Mediterranean *Anomia turbinata* has been quoted hitherto as a synonym of Müller's *Patella anomala* (*C. anomala*, Lovén). The researches of recent naturalists on the geographical distribution of the northern species show that it does not extend further south than Vigo Bay.

3. *Crania rostrata*, Höninghaus, Monog. p. 3, fig. 3 a, b.

Hab. West Africa.

No fresh observation has been made on this species since the publication, in 1846, of Mr. Sowerby's monograph of the genus. Its habitat, Mr. Cuming informs me, is not the Mediterranean, as given by Mr. Sowerby, but West Africa.

4. *Crania Suessii*, mihi, Conch. Icon. pl. 1. fig. 2.

Hab. Sydney: Strange.

Of this interesting Australian *Crania* Mr. Cuming possesses

five specimens, collected by Mr. Strange at Sydney. It comes very near to the West-African species, which has been assigned to *C. rostrata* of Hönninghaus; but it is of a more convex and roughly solid growth, and the difference of habitat leaves no room for doubt on the subject. The internal posterior scars of the lower valve are obliquely ovate and somewhat isolated, whilst those of the upper valve are narrow and callosely raised. The rostellum is large and prominent. Another character consists in the presence of a delicate tinge of orange-red colour on the outer surface, quite different from the red-stained colouring of the European species.

The name of Professor Suess being especially entitled to a place in the nomenclature of the Brachiopods, I dedicate this species to him, in testimony of my high sense of the originality and value of his researches.

2. ORBICULA, Sowerby.

A genus with the name *Orbicula* was founded by Lamarck for the reception of a northern Brachiopod, *Patella anomala*, Müller, which proved to be *Anomia craniolaris* pars, Linnæus, and the type of Retzius's genus *Crania*. A Mediterranean *Crania*, *Anomia turbinata*, Poli, was considered synonymous, but it has just been shown to be distinct. On meeting with the first-discovered specimen of the group under consideration, Lamarck created a genus, *Discina*, for its reception; while Sowerby confounded it with the northern *Crania*, of which Lamarck had made an *Orbicula*. Sowerby, Broderip, and Deshayes, out of all this confusion, adopted *Orbicula* for the Brachiopods of which we are treating; and it appears to me unnecessary to set aside their decision.

The shell of *Orbicula* differs from that of *Crania* in the very important particular of having the under valve thin and horny, furnished with a disk, in which is a slit for the passage of a pedicle of attachment. The disk is subcentral, more or less inclined to be posterior, and corresponds in position with the vertex of the upper valve. In some species the vertex is posterior, and the disk is also posterior; in others the vertex is a little posterior to central, and the disk is also a little posterior to central. That is the natural symmetrical growth of the shell on a plane surface; but if the animal adheres to a declivitous surface, the disk and vertex, which, on a plane surface, would be subcentral, press more posteriorly; and if the surface be hollow, the under valve is more convex, and the vertex and disk more central.

Seven species of *Orbicula* are now known. We have none in the European seas. The original species, found among ballast

on the roads (*O. ostreoides*), is supposed to be a native of the shores of North or West Africa; and there is a small species (*O. stella*) in the Eastern Seas. The rest are inhabitants of the New World, where *Crania* is unknown. *O. stella* has an analogue in the West Indies in *O. Antillarum*, and an allied representative, of more solid growth, in *O. Cumingii*, which ranges along the western coast of America, from Peru to Guatemala, and reaches to Mazatlan. The most striking type of the genus is that represented by three species on the coast of Peru, but not extending northward to Central America—*P. lamellosa*, *lævis*, and *tenuis*, of the last of which Mr. Cuming possesses specimens, strange to say, from South Australia.

Synopsis of Species.

1. *Orbicula ostreoides*, Lamarck, Anim. sans Vert. 1819, vol. vi. part 2. p. 237.

Discina ostreoides, Lamarck.

Orbicula Norvegica, Sowerby, in Linn. Trans. 1822 (not of Lamarck).

Orbicula striata, Sowerby, in Thes. Conch. 1846.

Crania radiosa, Gould.

Orbicula Evansii, Davidson.

Hab. North-west Africa? (in crevices of brown oxide of iron).

This species was originally named *Discina ostreoides* by Lamarck, from a specimen sent to him, in 1819, by Mr. James Sowerby, father of Mr. G. B. Sowerby, sen., who described it the following year, in a paper read before the Linnean Society (but not published until 1822), as *Orbicula Norvegica*. He had discovered it in abundance in the crevices of a quantity of ballast stone (brown oxide of iron) used in the neighbourhood of Lambeth for mending the roads. Mr. Sowerby makes no mention in his monograph, published twenty-four years later in his son's 'Thesaurus Conchyliorum,' of having described this species as *O. Norvegica*, but names it for the first time *O. striata*, although he bears testimony to its being the species on which Lamarck founded his genus *Discina*.

I am of opinion that Mr. Davidson's *O. Evansii* is a specimen of *O. ostreoides* in which the vertex of the upper valve and corresponding disk of the lower valve are more central than usual, owing to the shell's position of attachment in the hollow grooved crevice of the iron-stone; and the lower valve is more convex for the same reason. The type-specimen of *O. Evansii* is exactly like distorted specimens of *O. ostreoides* jammed within the crevices of the iron-stone. At first I fancied that the habitat Bodegas, California, given by Mr. Davidson for *O. Evansii*, on the authority of Mr. Cuming, might be a mistake; but it may be remembered by those who have studied the phenomena of

geographical distribution that the fauna of the West-African sea north of Sierra Leone, whence *O. ostreoides* is supposed to have come, is in part identical with the fauna of the seas of California and the West Indies. Our British *Phasianella pulla*, which ranges southward to West Africa, appears also in the West Indies; and when preparing my monograph of *Terebra* in 'Conch. Iconica,' I had no hesitation in declaring that *T. variegata*, *Africana*, *Hupei*, *intertincta*, *marginata*, *albocincta*, *Hindsii*, and *subnodosa*, described by various authors from the mouth of the Gambia, Senegal, Mazatlan, and California, are all varieties, and but slightly varying varieties, of one and the same species.

2. *Orbicula stella*, Gould, Exped., Shells, Proc. Bost. Soc. 1846; Otia Conch. p. 120.

Discina stellâ, Gould.

Hab. China Seas; Wilkes. Singapore and Philippine Islands; Cuming.

This species has a wide distribution in the Eastern seas. On comparing authentic specimens received from Dr. Gould, collected in the China Seas by Wilke's Exploring Expedition, I find them identical with specimens, attached to fragments of *Pul-lastra*, *Pinna*, and *Malleus*, collected by Mr. Cuming at Singapore and at the Philippine Islands. The sculpture varies in strength. In young specimens, as stated by Dr. Gould, the radiating striæ are scarcely developed; in older specimens, that have had to contend with irregularities in their place of attachment, the sculpture has a minutely latticed character, like the grain of a thimble. The under valve is thinly membranaceous, or thicker, concave or convex, according to circumstances of habitation; and the position of the slit obviously varies with the position of the vertex in the opposite valve. On a flat place of attachment the shell is symmetrically orbicular, and the vertex and subcumbent slit are nearly central; but when attached to a sloping or declivitous substance, the vertex is pressed to one side, and the slit of the under valve follows the same direction.

3. *Orbicula Antillarum*, D'Orbigny, Moll. Hist. Cuba, 1853, p. 368, pl. 28. figs. 34-36.

Hab. Cuba, Martinique.

Mr. Cuming possesses specimens of *O. Antillarum*, both from Cuba and Martinique, in all of which the vertex is inclined posteriorly, while the shell is less cancellated than in the Eastern *O. stella*; but the shells are wonderfully alike in their general aspect.

4. *Orbicula Cumingii*, Broderip, Proc. Zool. Soc. 1833, p. 124.

Orbicula Cumingii and *strigata*, Broderip.

Hab. Central America, dredged at Payta, St. Elena, Panama, and Isle of Caña, Guatemala, attached to the lower side of stones in sandy mud at low water, and, in some instances, at depths of from 6 to 18 fathoms: Cuming. Ecuador: D'Orbigny. Mazatlan (attached to various shells): Carpenter, in Cat. Reigen Collection.

Mr. Broderip's *O. strigata*, which he did not describe along with *O. Cumingii* in the 'Proceedings of the Zoological Society,' but afterwards, when figuring the *Orbiculæ* in the 'Transactions,' is a less-worn state of the species, in which there are rays and bands of colour. The upper valve is calcareous and firm, of quite a different type from the horny *Orbiculæ* of Chili and Peru. The habitats Malacca and Philippine Islands, given with this species by Mr. Sowerby, are erroneous. He probably mistook specimens of *O. stella* for it.

5. *Orbicula laevis*, Sowerby, Trans. Linn. Soc. 1822, vol. xiii. part 2. p. 468, pl. 26. fig. 1 *a, b, c, d*.

Hab. Concepcion, Chili (found attached to *Mytili* at the depth of 6 fathoms): Cuming.

O. laevis was first described by Mr. Sowerby in a paper read before the Linnæan Society in 1820 (but not published till 1822) from a specimen attached to a grey flint pebble nearly coated by the root of an *Isis*, of which the habitat was not known. Twelve years later, the species was found attached to *Mytili* dredged by Mr. Cuming at Concepcion, Chili. It is a stout horny shell, with the surface smooth and faintly malleated. The vertex, which inclines much posteriorly, is conically raised, swollen, and rather obtuse.

6. *Orbicula tenuis*, Sowerby, Thes. Conch. vol. i. p. 366, pl. 73. fig. 4.

Hab. Chili: Cuming. South Australia.

Compared with the preceding species, *O. tenuis* is thinner, rounder, and more depressed. The original group of specimens was collected by Mr. Cuming on the coast of Chili; but he possesses specimens of an *Orbicula* of a lighter and more glossy substance, which is perfectly identical with this, from South Australia.

7. *Orbicula lamellosa*, Broderip, Proc. Zool. Soc. 1833, p. 124.

Hab. Iquiqui and Bay of Ancon, Peru: Cuming.

This very characteristic species, as related by Mr. Broderip,

was found by Mr. Cuming in groups, the specimens being in many instances piled in layers one over the other, on a sandy bottom, at a depth ranging from 5 to 9 fathoms. At Ancon they were found attached to dead shells, and also clinging to the wreck of a Spanish vessel of about 300 tons, that went down in the bay about ten years before. The sunken timbers (for the sheathing was gone to decay) were covered with these shells, much in the same way that beams on land are sometimes infested with parasitic Fungi. At Iquiqui they were taken adhering to a living *Mytilus*.

Figures of the type-specimens and groups of *Crania* and *Orbicula* will appear in the forthcoming thirteenth volume of the 'Conchologia Iconica,' to be published in the course of a few days.

XVI.—On *Ephedra*.

By JOHN MIERS, F.R.S., F.L.S. &c.

[Continued from vol. ix. p. 437.]

It has been the opinion of many botanists that the existence of annularly dotted vessels in the wood of the *Gnetaceæ* affords evidence of their close affinity with the *Coniferæ*; but even if this had been true, it would have claimed, on its own merit, a very secondary importance, since we find such vessels also in the *Winteraceæ*, *Canellaceæ*, *Schizandraceæ*, &c. Dr. Lindley says of *Gnetum* that its wood "is composed of woody fibres and of annular and reticulated vessels lying scattered sparingly among tubes of woody fibre"* . He says also that its wood is zoneless. These circumstances led that eminent botanist to conclude that the *Gnetaceæ* are very distinct from the *Coniferæ*, forming a link between *Taxineæ* and *Piperaceæ*: this, at least, was his opinion in 1834, although other considerations induced him afterwards to modify his view of the place of this small family in the system. I have noticed, however, that the wood of *Ephedra* is regularly zoned, as in other exogenous plants; for a transverse section of a branch of *Ephedra Andina* which I possess shows five distinct concentric rings, the intervals between the medullary rays exhibiting numerous longitudinal hollow air-cells. The branches of *Gnetum*, on becoming dry, separate readily at the nodes by distinct articulations; but such separation rarely takes place in *Ephedra*. On the other hand, a longitudinal section of a new branch of the latter genus shows that the central pith of one internode is not continuous with the pith of the next internode, nor with that of their accessory branchlets;

* Bot. Reg. vol. . pl. 1086.